Sea Rise Data Integrator Notes

This Sea Rise complex consists of two apartments building located in Brooklyn, NY. Both buildings have two CoastIntelligen engines powered off natural gas with a total capacity of 120 kW per building. Heat is recovered by jacket water and exhaust for use in offsetting domestic hot water load. Data for this site is collected by Connected Energy and provided to CDH Energy.

Data Point Details

The data at this site is provided by Connected Energy in the form of comma-separated value (CSV) files. There are two files for each day containing 15-minute timestep data for the two sites with 19 data points for Sea Rise 1 and 15 data points for Sea Rise 2. Two data files are uploaded on a nightly basis containing the previous days data. From these 15-minute values, the hourly databases is formed. It is unclear whether the 15-minute data is sampled or averaged across the interval. The details for each individual data point are outlined below.

The timestamp in the raw data files is in Eastern Local Time. This means it obeys the Standard to Daylight savings time rules for the Eastern timezone. For display purposes, we convert the timestamp from Local Time to Eastern Standard Time for all graphical figures on the website. This means that during the Daylight Savings Time period from the first Sunday in April until the last Sunday in October the monitored data plots, CSV output and standardized PDF reports are in Eastern Standard Time and do not obey Daylight Savings time rules. Presenting data in Standard Time throughout the year is common practice for graphical time series plotting because it eliminates skipping an hour in April and duplicating an hour in October.

DG/CHP Generator Output (total kWh)

The data for Generator Output comes from a 15-minute accumulator for the total power produced by the engines. The column of origin for this data point is labeled “Produced Power Cumul.” in the data files received from Connected Energy. The difference between consecutive records is assigned as the energy produced by the engine for that interval. This 15-minute energy data is then summed into hourly data.

DG/CHP Generator Output Demand (peak kW)

The data for Generator Output comes from a 15-minute average for the generator demand. The column of origin for this data point is labeled “Produced Power Rate” in the data files received from Connected Energy. The maximum for a given hour is assigned to the hourly database.

DG/CHP Generator Gas Input (cubic feet)

The data for Generator Gas Input comes from a 15-minute accumulator for total gas flow to the generator. The column of origin for this data point is labeled “Cogen Cumul. Gas Use” in the data files received from Connected Energy. The difference between consecutive records is assigned as the energy produced by the engine for that interval. This 15-minute energy data is then summed into hourly data.

Total Facility Purchased Energy (total kWh)
The data for Facility Purchased Energy comes from a 15-minute accumulator for the power imported from the utility. The column of origin for this data point is labeled "Grid Power Cumul." in the data files received from Connected Energy. The difference between consecutive records is assigned as the energy produced by the engine for that interval. This 15-minute energy data is then summed into hourly data.

Total Facility Purchased Demand (peak kW)
The data for Facility Purchased Demand comes from a 15-minute average for the utility import. The column of origin for this data point is labeled "Grid Power Rate" in the data files received from Connected Energy. The maximum for a given hour is assigned to the hourly database.

Other Facility Gas Use (cubic feet)
There is no suitable data available for this data point from the Connected Energy data.

Total Facility Energy (total kWh) and Total Facility Demand (peak kW)
These two data points are the sum of the DG/CHP Generator Output and Total Facility Purchased data points.

Unused Heat Recovery (total MBtu/h)
There is no suitable data available for this data point from the Connected Energy data.

Useful Heat Recovery (total MBtu/h)
The Useful Heat Recovery comes from a 15-minute accumulator for the total useful heat recovery rate. The column of origin for this data point is labeled "Cogen Heat Rec Cumul**"** in the data files received from Connected Energy. The difference between consecutive records is assigned as the cogen heat recovery for that interval. This 15-minute recovery data is then summed into hourly data.

Status/Runtime of DG/CHP Generator (hrs)
Both engines are defined as being fully on for a 15-minute interval if the total engine power output is greater than 60 kW for the period (the fully-loaded capacity is approximately 120 kW). The status is given a value of 0.5 (15 minutes times 2 generators) if the generator output is above 60 kW. Between 45 and 60 kW, 45 kW is subtracted from the generator output, which is then divided by 15 kW and added to 0.25 hrs to estimate partial runtime. Between 25 and 45 kW, 0.25 is assigned for the generator status. Finally, between 0 and 25kW, the generator output is divided by 25 kW and multiplied by 0.25 to estimate generator runtime. This 15-minute data is then summed into hourly data for the online database.

Ambient Temperature (avg °F)
The Ambient Temperature comes from a 15-minute average for outdoor temperature. The column of origin for this data point is labeled "Ambient Temp" in the data files received from Connected Energy. The 15-minute average temperature is averaged into hourly data for the online database.

Total CHP Efficiency (%)
The Total CHP Efficiency is calculated from the online hourly database as the sum of the Useful Heat Recovery and the DG/CHP Generator Output, converted from kWh to MBtus, divided by the DG/CHP Generator Gas Input. The gas input is converted to MBtus using the Lower Heating Value (LHV) of the fuel which is 0.930 MBtu/cubic foot (Natural Gas).

Electrical Efficiency (%)
The Electrical Efficiency is calculated from the online hourly database as the DG/CHP Generator Output, converted from kWh to MBtus, divided by the DG/CHP Generator Gas Input. The gas input is converted to MBtus using the Lower Heating Value (LHV) of the fuel which is 0.930 MBtu/cubic foot (Natural Gas).

Data Quality Checks

The Data Quality Checks consist of three levels of verification: does the data exist, does the data pass reasonable range checking and does the data pass relational checks. The methodology for applying the data quality begins by creating a contiguous database. This is necessary to maintain compatibility between the many sites on the server. Next, the data received for this site is fit into the database, in this case we are using 15-minute data. For any period where there is data, the data quality level is set to 3 for "Passes Relational Checks". We then work backwards to identify data that does not meet Relational and/or Range Checking.

The next step is to apply the relational checks. Relational checks attempt to identify data which is uncorroborated by the rest of the data set. For instance, data received indicating a DG/CHP Generator output when the gas use is zero is suspect. For data failing a relational check, the data quality level is set to 2 for "Data Passes Range Checks" or 1 for "Data Exists".

The last step is evaluating the range checks. The range checks consist of reasonable high and low values based on facility and DG/CHP Generator information. Data that falls outside the defined range for the database value has its data quality level set to 1 for "Data Exists."

It is necessary to work backwards when applying data quality checks to insure that data gets set to the lowest applicable data quality level. It is possible for data to pass the relational check and fail the range check and such data will be set to a data quality level of 1 for "Data Exists."

Table 1. Data Quality Definitions

Data Quality Levels	Description	Definition
3	Passes Relational Checking	This data passes Range Checks and Relational Checks. This is the highest quality data in the data set.
2	Passes Range Checks	This data passes the Range Checks but is uncorroborated by Relational Checks with other values.
1	Data Exists	This data does not pass Range Checks. This data is found to be suspect based on the facility and/or CHP equipment sizing.
0	Data Does Not Exist	This data is a placeholder for maintaining a contiguous database only.

Details on the Range and Relational Checks are found below.

Relational Checks

These checks are applied to the 15-minute data before it is converted to hourly data. If any of the 15-minute data points fails the relational check, the data for the entire hour is marked as failed.

Table 2. Relational Checks for Sea Rise

Evaluated Point	Criteria	Result
FG	WG > 0 and FG <= 0	DQ Level for FG set to 2
WG, WG_KW, SG	WG = 0 and WG_KW > 0	DQ Level for WG_KW, WG and SG set to 2
WG, WG_KW, SG	WG > 0 and WG_KW = 0	DQ Level for WG_KW, WG and SG set to 2

Notes: FG – DG/CHP Generator Gas Use
WG – DG/CHP Generator Output
WG_KW – DG/CHP Generator Output Demand
SG – Status/Runtime of DG/CHP Generator

Range Checks

These checks are applied to the 15-minute data before it is converted to hourly data. If any of the 15-minute data points fails the range check, the data for the entire hour is marked as failed.

Table 3. Range Checks for Patterson Farms

Data Point	Hourly Data Method	Upper Range Check	Lower Range Check
DG/CHP Generator Output	Sum	32 kWh	0 kWh
DG/CHP Generator Output Demand	Maximum	125 kW	0 kW
DG/CHP Generator Gas Use	Sum	375 cubic feet	0 cubic feet
Total Facility Purchased Energy	Sum	125 kWh	0 kWh
Total Facility Purchased Demand	Maximum	500 kW	0 kW
Other Facility Gas Use	Sum	N/A	N/A
Unused Heat Recovery	Sum	N/A	N/A
Useful Heat Recovery	Sum	375 MBtu	0 MBtu
Status/Runtime of DG/CHP Generator	Sum	0.5 hrs	0 hrs
Ambient Temperature	Average	130°F	-30°F

Notes: Data failing the Range Check has the data quality level set to 1 for "Data Exists"

ASERTTI Protocol Adherence

This site adheres partially to the ASERTTI Long-Term Monitoring Protocol. Data is provided in 15-minute intervals satisfying the protocol. The thermal energy recovered and inlet air temperature are not provided in the data. The only optional data received from Connected Energy is the ambient temperature.

Monitoring Notes

August 31, 2006

CDH begins receiving daily file uploads from Connected Energy for this site.